Lecture Module - To Err is Human

ME3023 - Measurements in Mechanical Systems

Mechanical Engineering

Tennessee Technological University

Topic 1 - Accuracy and Error

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- Accuracy and Error
- Estimating Error
- Uncertainty Interval
- Activity with Data!

Accuracy and Error

The exact value of a variable is called the _____ _____. The value of the variables as indicated by a measurement system is called the _____ _____. The _____of a measurement refers to the closeness of agreement between the measured value and the true value. But the _____ _____is rarely known _____, and various influences, called _____, have an effect on both of these values. So the concept of the _____of a measurement is a _____one.

Text: Theory and Design of Mech. Meas.

Estimating Error

The _____ _____can be estimated but cannot be known _____. In practice a _____value is used in place of the true value. We will discuss this again the the *Calibration Module*.

An estimate of error based using this value is sometimes referred to as _____ _____.

Activity with Data!

"The _____is a numerical estimate of the possible range of the error in a measurement. In any measurement, the _____is not known exactly since the true value is rarely known exactly. But based on available information, the operator might feel confident that the error is within certain bounds, a plus or minus range of the indicated reading. This is the assigned _____."

We will discuss this again the the *Uncertainty Module*.

Text: Theory and Design of Mech. Meas.

Activity with Data!

Experiment: We are going to collect data with the sensor suite on our phones.

Sensor:

- GPS - concept graphic
- info from manufacturer

Logger Apps:

- sensorlogger (Android) - Kelvin Choi
- Sensor Logger (OSX) -Choi Tsz Hei

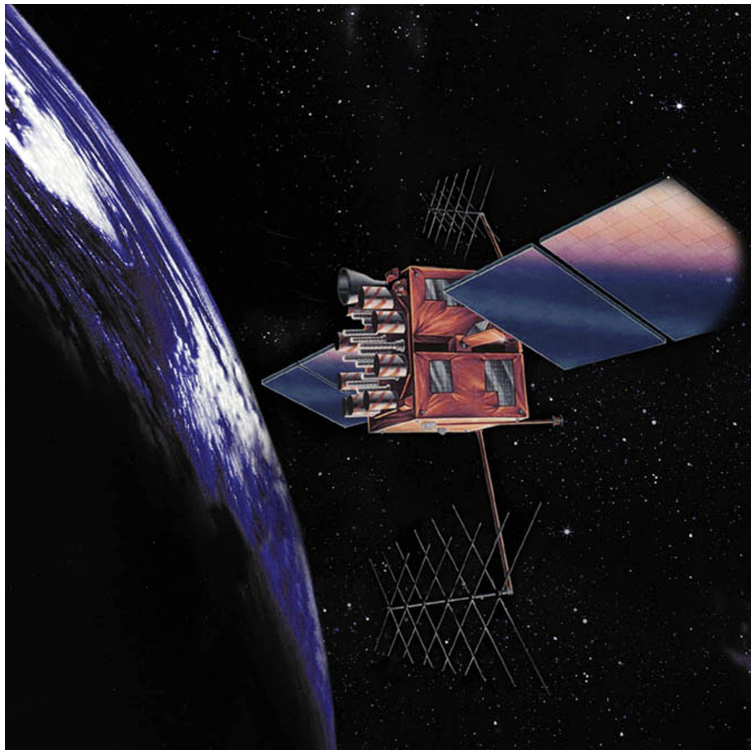
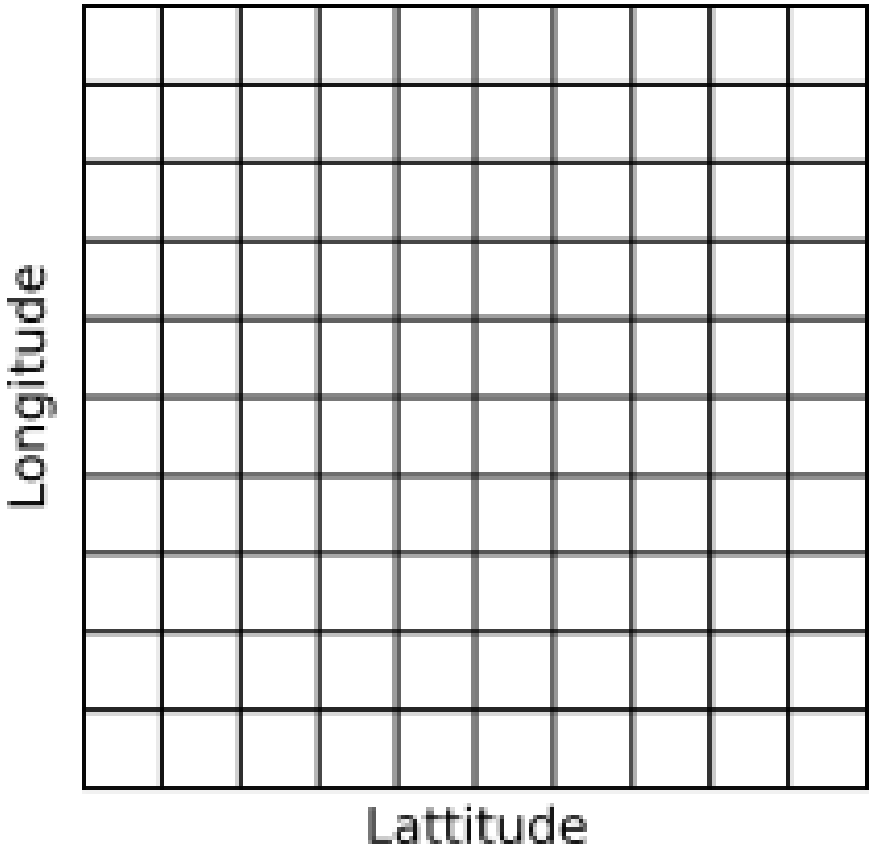


Image:Wikipedia

Activity with Data!

Part 1 - Informed Prediction: Generate data you expect the GPS in your phone to report. Show the data points on the graph to the right.

i	lat_i	lon_i
1		
2		
3		
4		
5		



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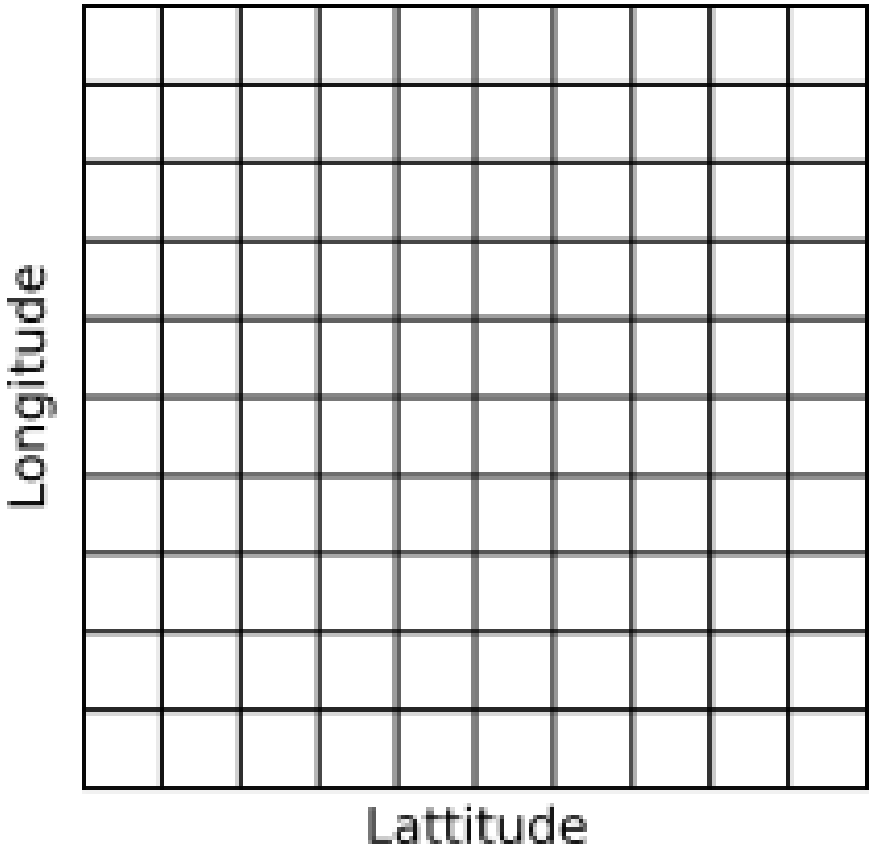
Activity with Data!

Part 2 - Measurement: Record GPS from your phone. Show the data points on the graph to the right. You can use export feature in Sensor Logger to report the data.

i	lat_i	lon_i
1		
2		
3		
4		
5		
6		
7		
8		
8		
9		
10		



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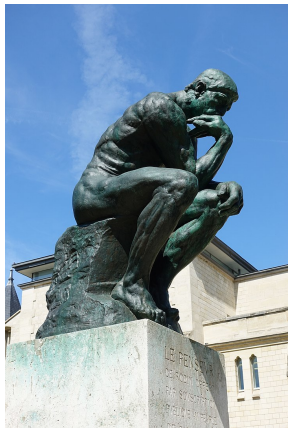
Activity with Data!

Part 3 - Analysis/Results/Conclusions: Compare and contrast the two sets of data. What conclusions can you make about your predictions or the sensor data?

- Were the predictions reasonable?
- What type of error is present in the recorded data?
- What should be used as a reference for this data?



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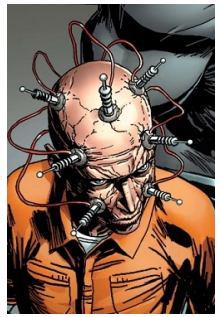

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